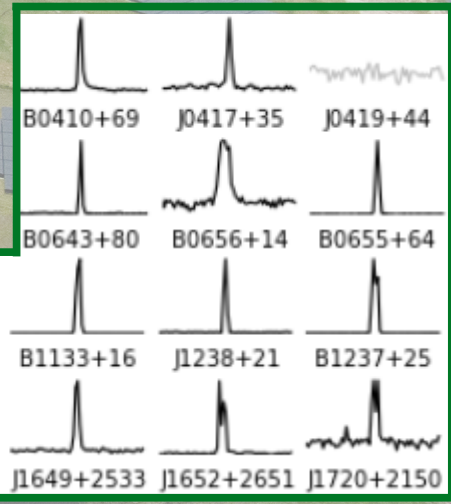
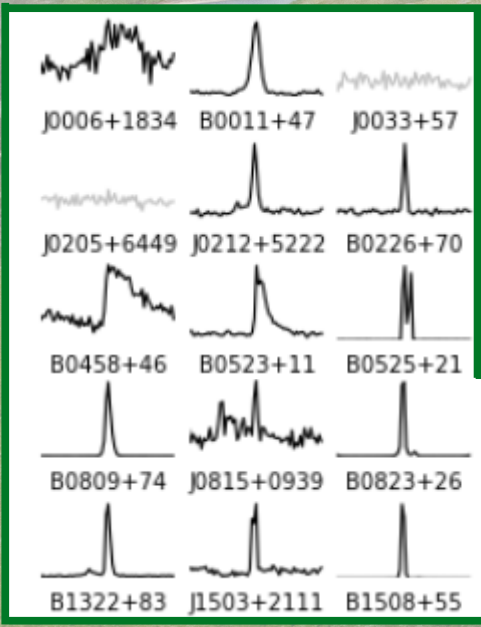


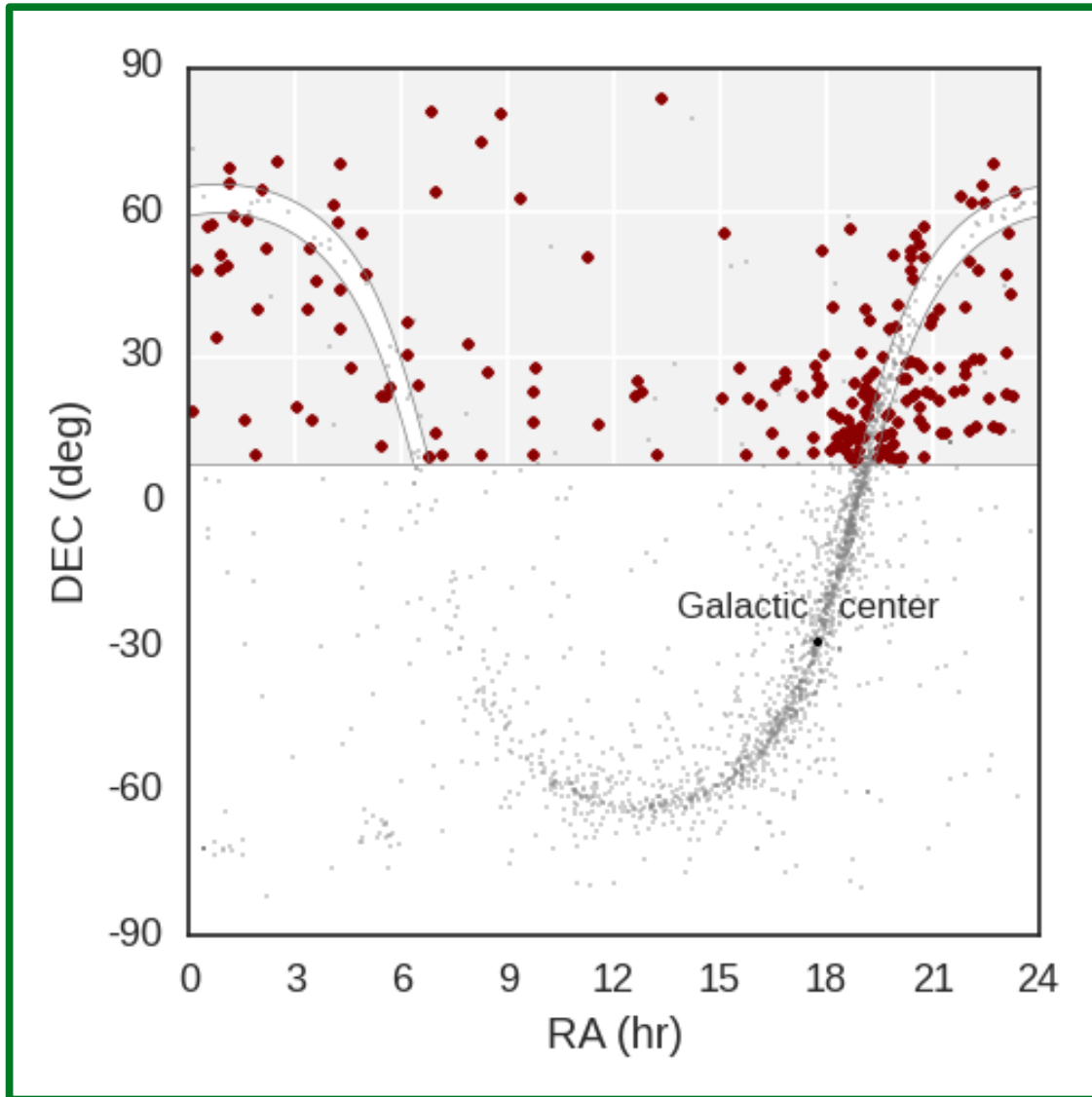
Anna Bilous (UvA, RU)

**Vlad Kondratiev (ASTRON)
and LOFAR PWG**

LOFAR census of non-recycled pulsars



Sample selection



**194 Northern sources,
DEC > 8 deg**

**outside Galactic plane,
|b| > 3 deg**

**Well-known coordinates;
Not in GCs; not MSPs**

HBA, 110 – 188 MHz

LBA, 30 – 90 MHz (to follow)

LC1_003, Core, 77 hours

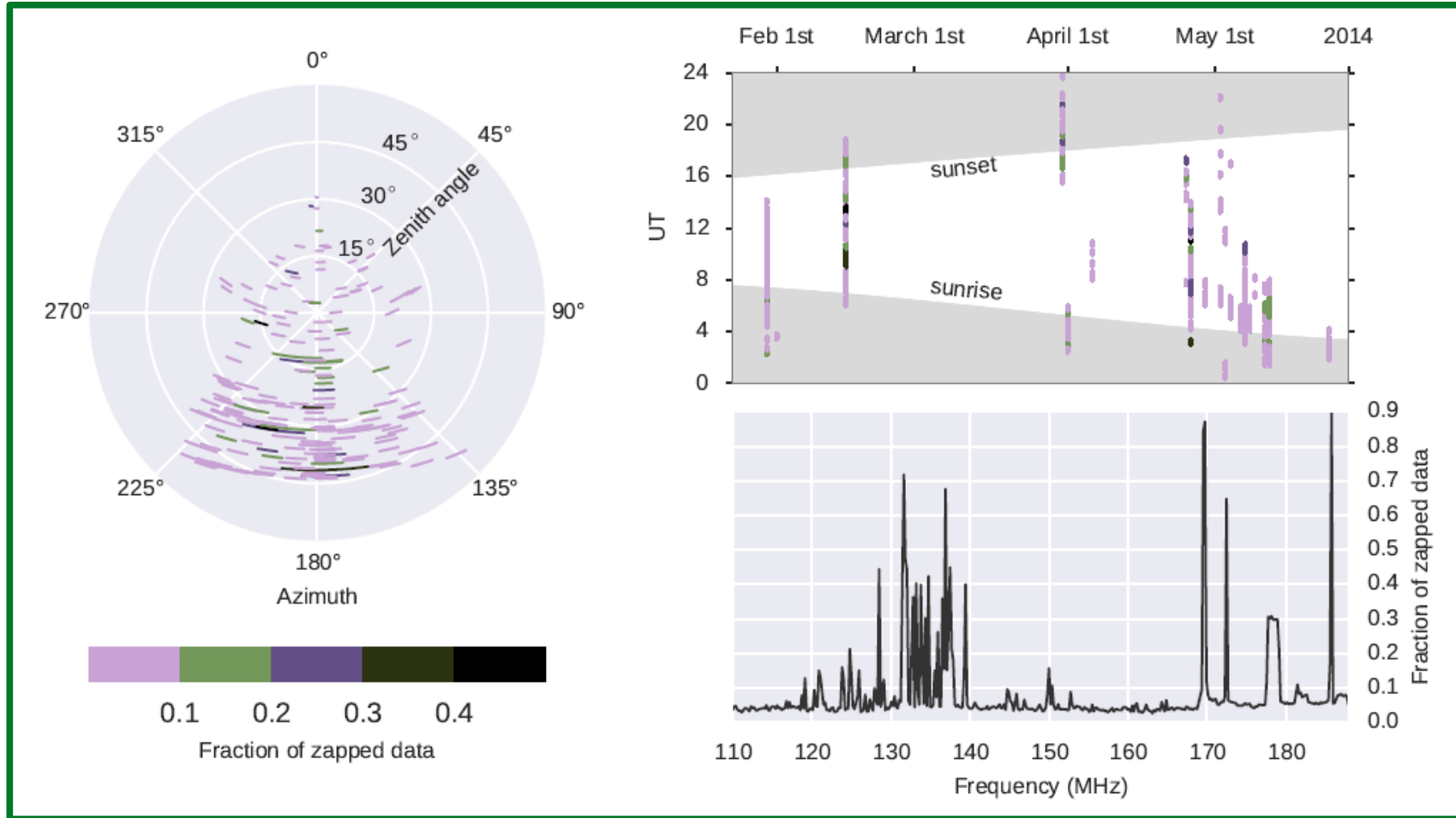
IQUV, 8-bit, 400 subs

32 – 256 chan/sub

Obs. time per pulsar:

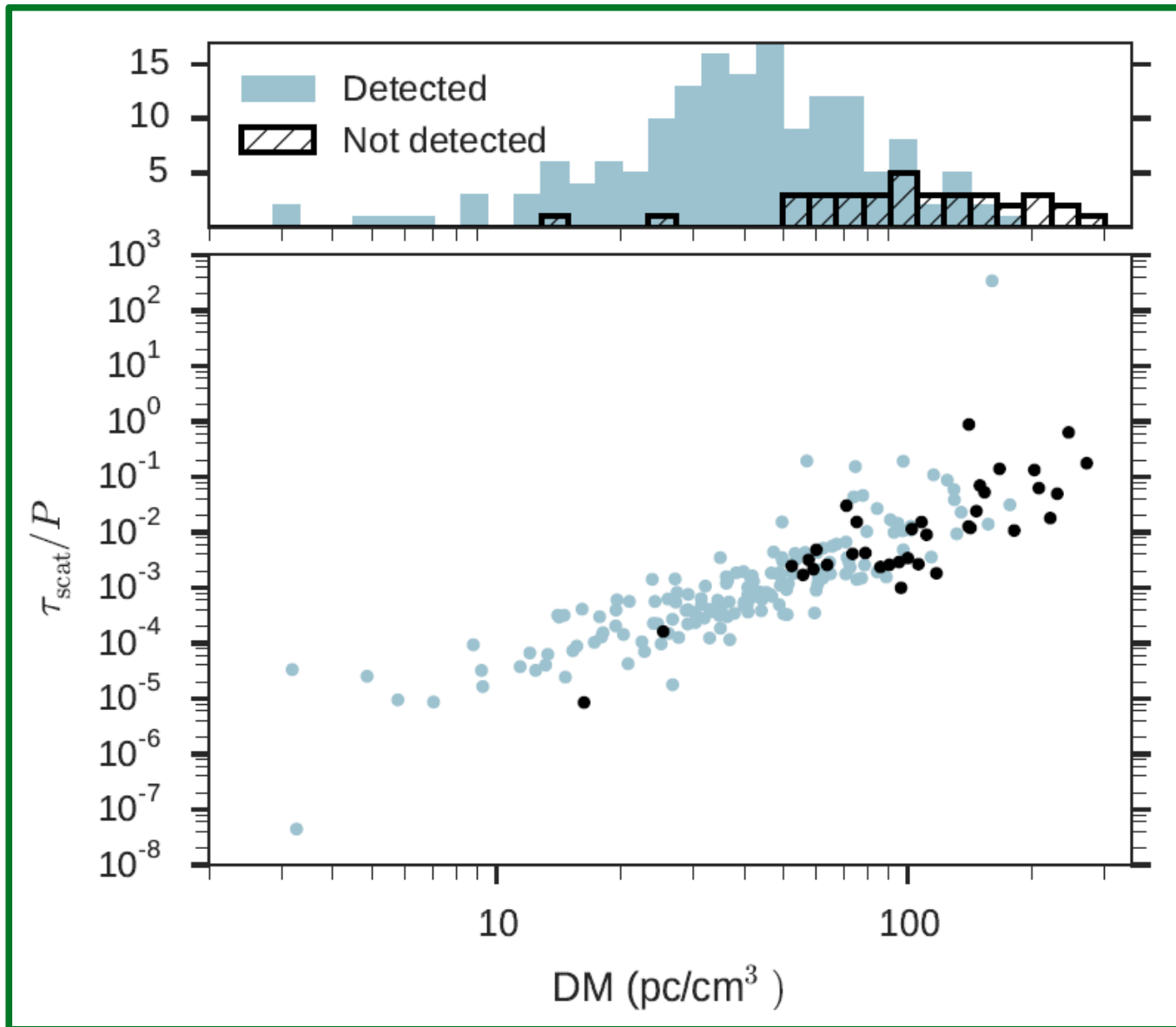
max{1000 P, 20 min}

RFI environment



No severe RFI → median RFI fraction = 5%;
1 observation – 46%

DM vs. scattering



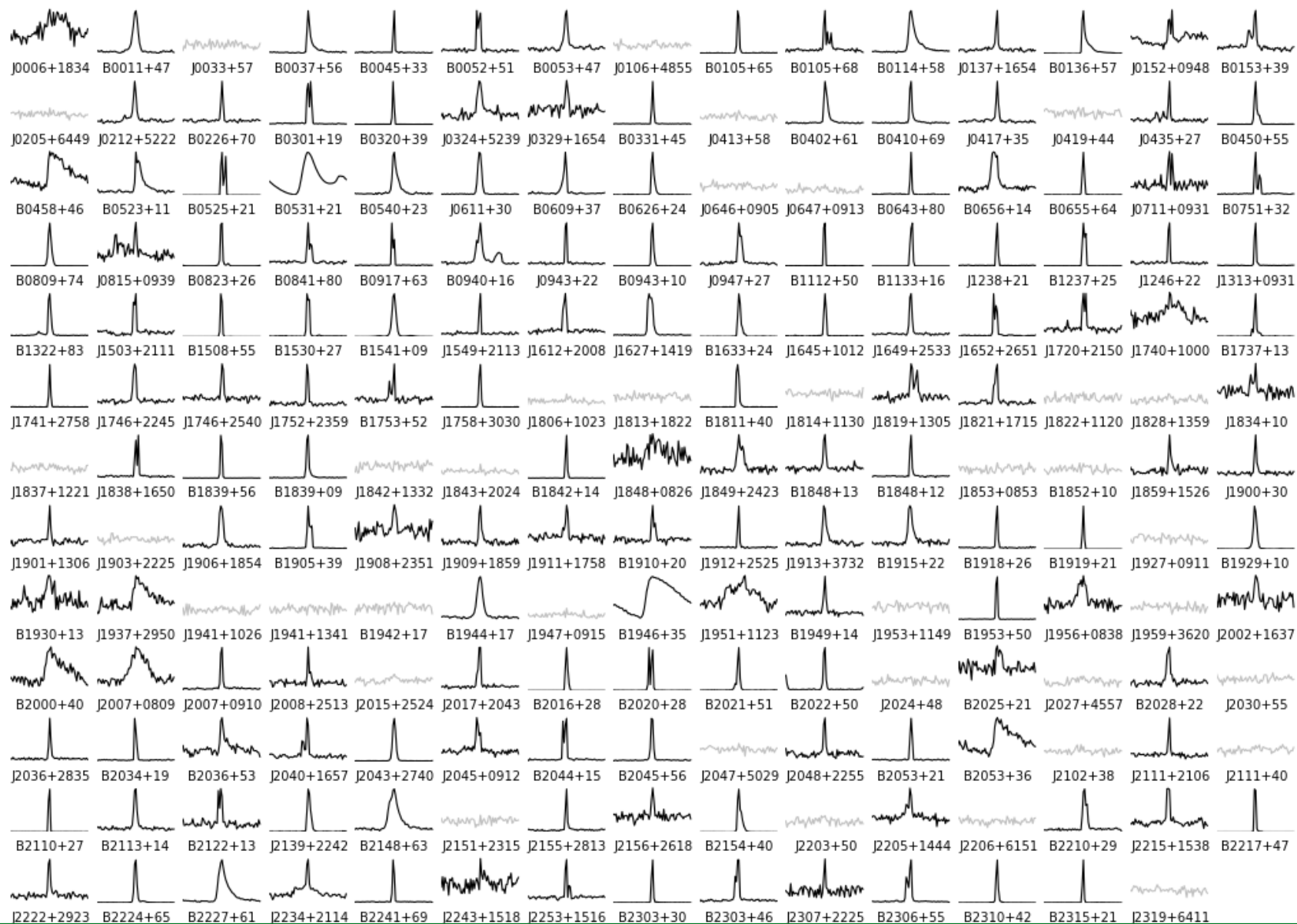
Tscat @ 150 MHz

**B1930+13 →
DM=180 pc/cc**

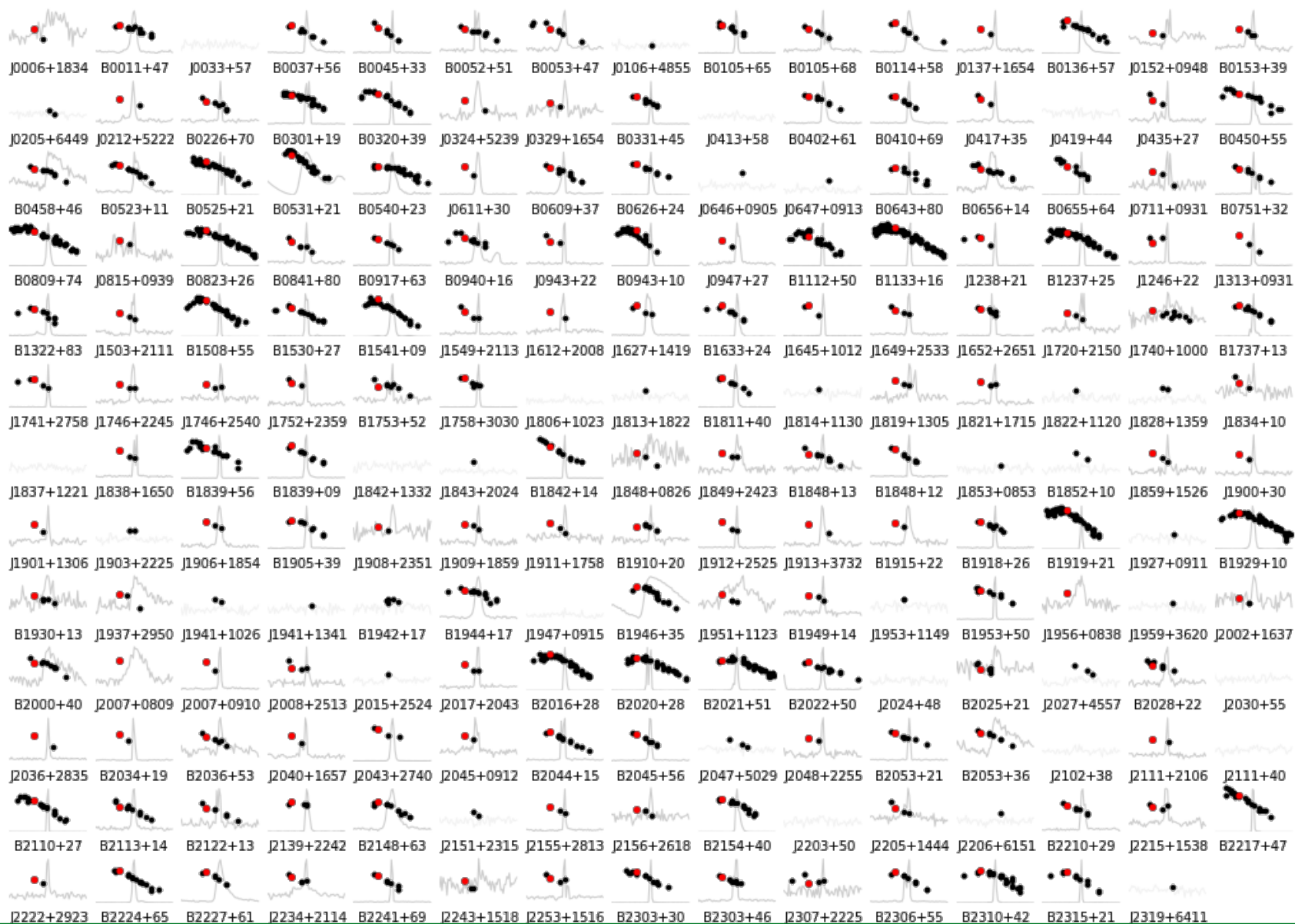
**B2036+53 →
DM=160 pc/cc
Predicted Tscat =
486 s! (NE2001)**

**Measured Tscat =
0.4 s @ 129 MHz**

LOFAR HBA CENSUS
All normal PSRs with well-known coordinates above DEC=8 and |GB|=3 (v.3)

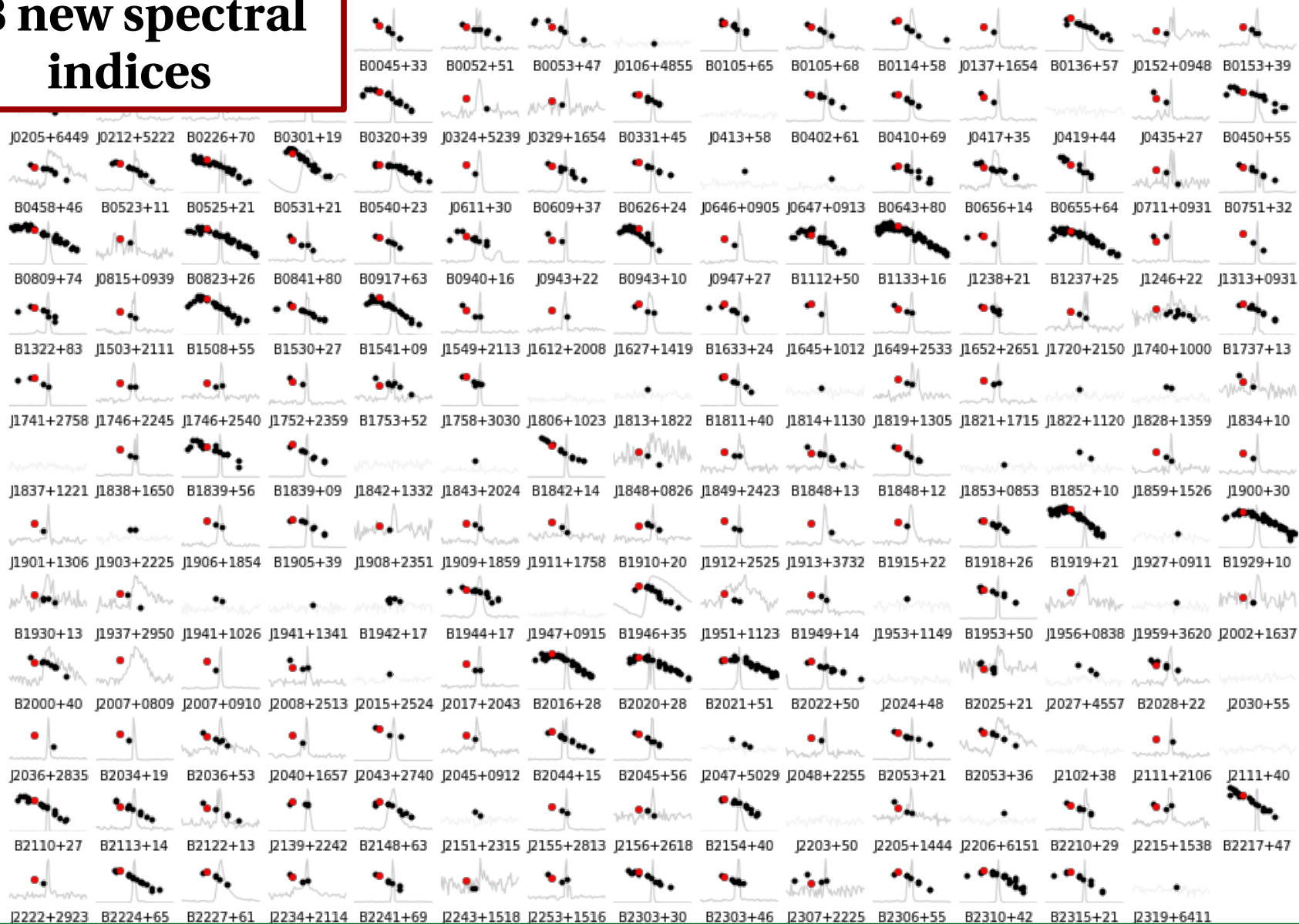


LOFAR HBA CENSUS
All normal PSRs with well-known coordinates above DEC=8 and |GB|=3 (v.3)

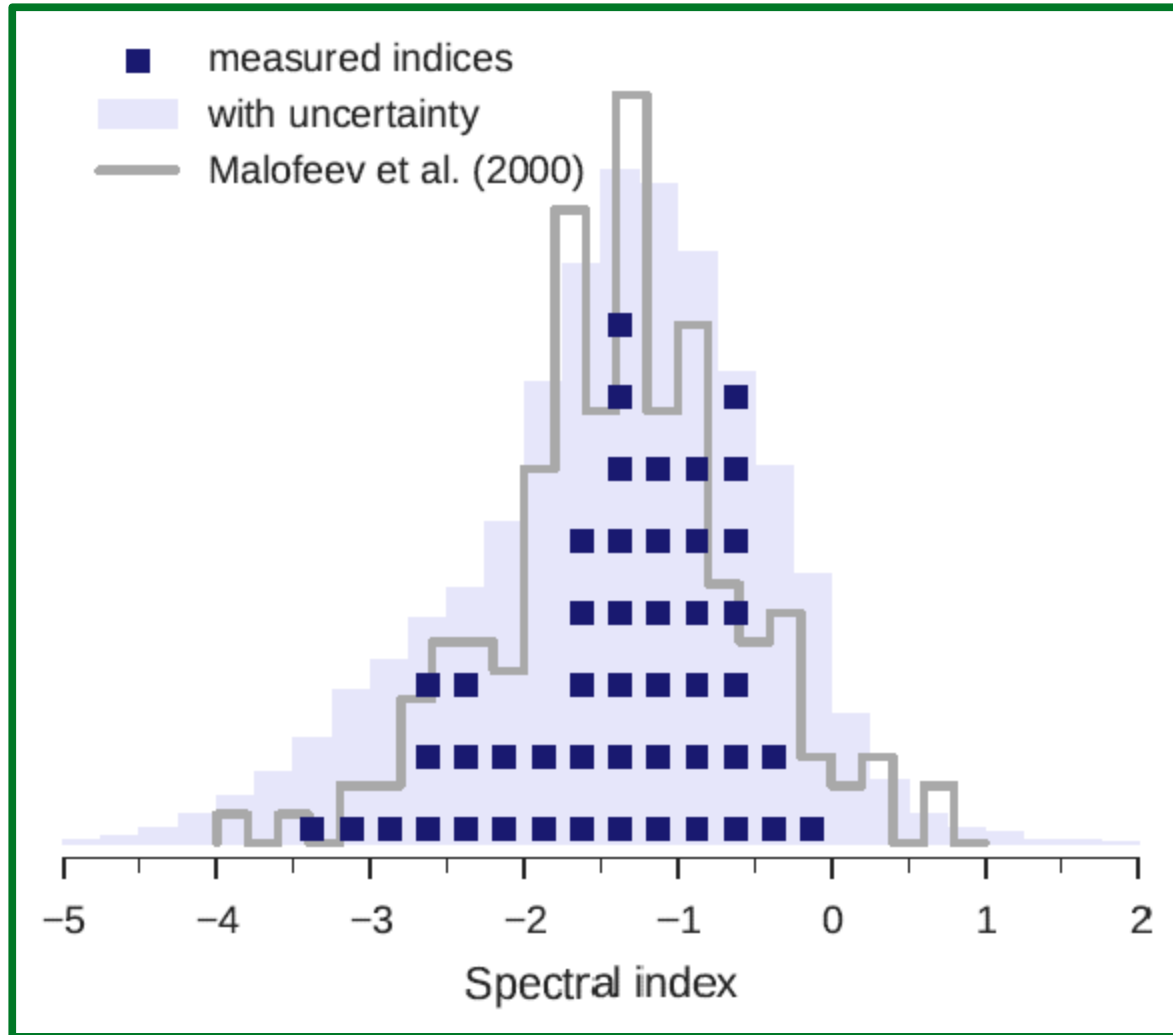


LOFAR HBA CENSUS
All normal PSRs with well-known coordinates above DEC=8 and |GB|=3 (v.3)

48 new spectral
indices

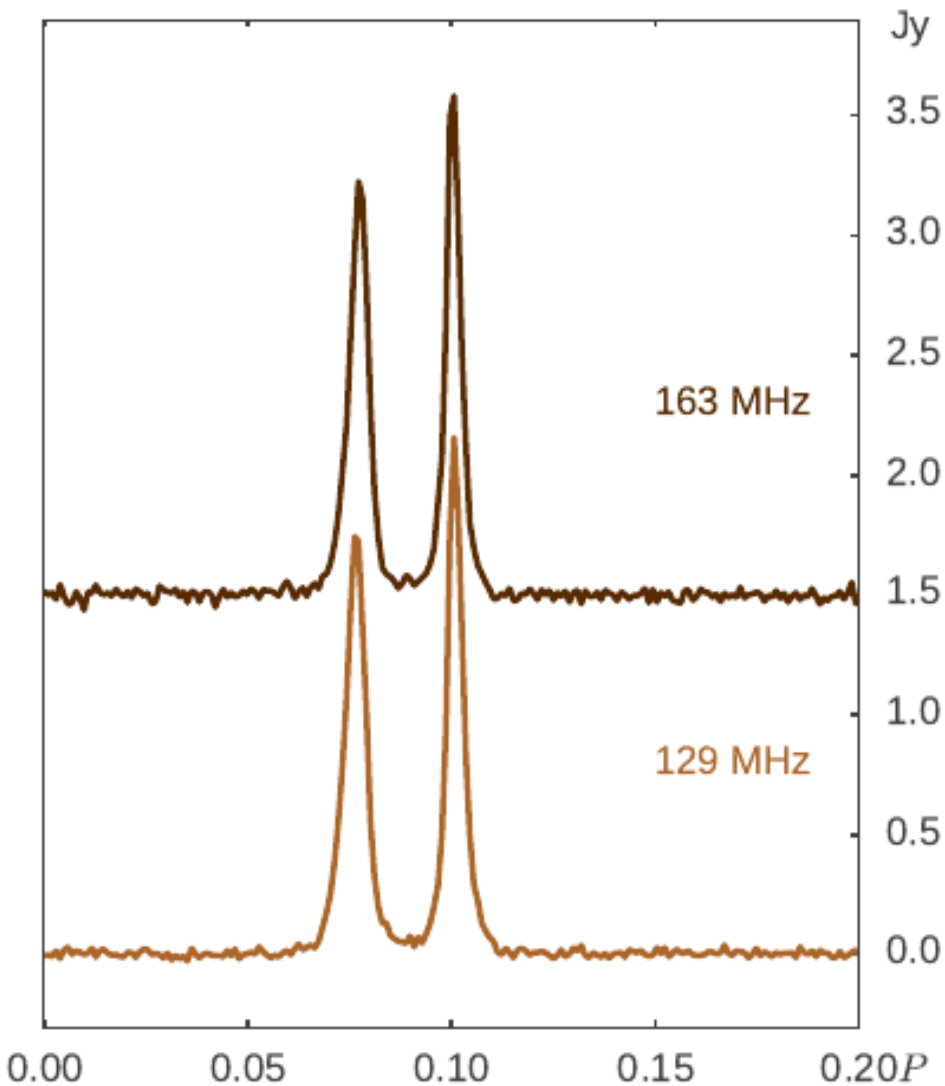
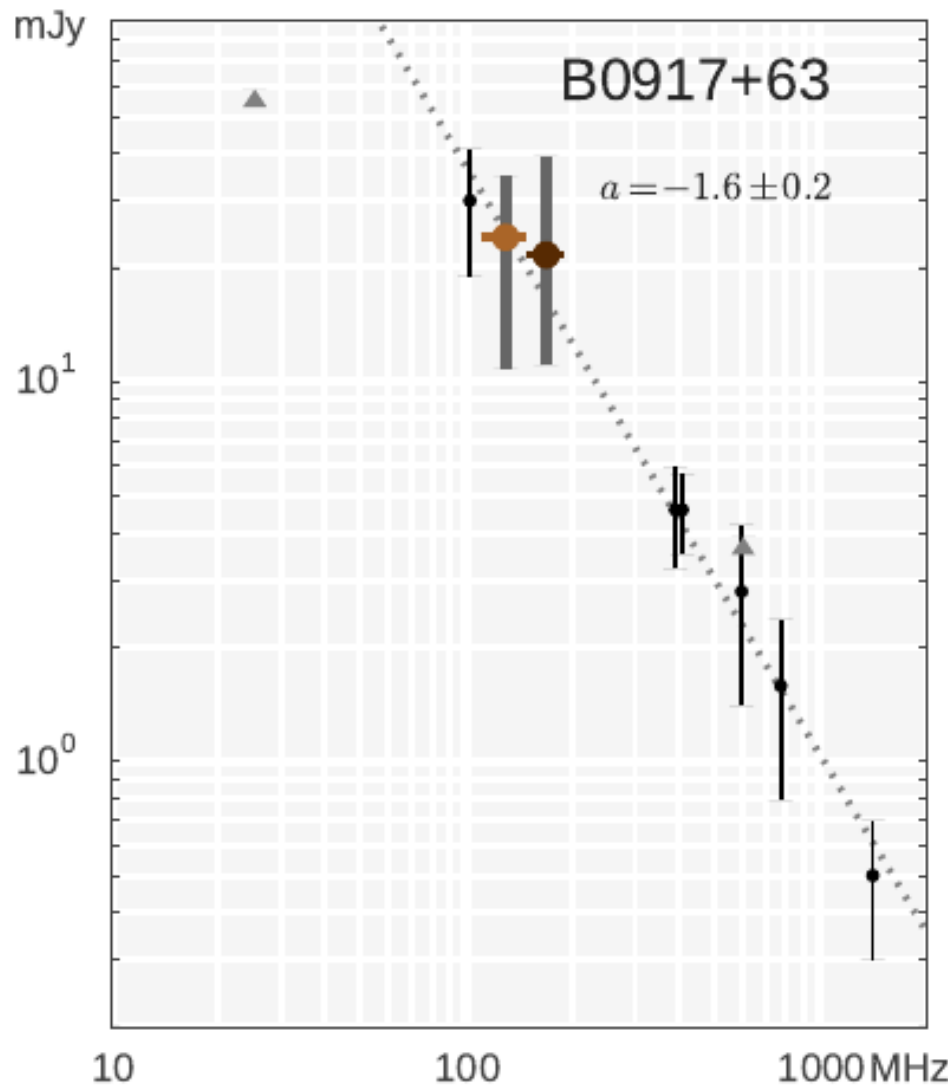


Spectral indices

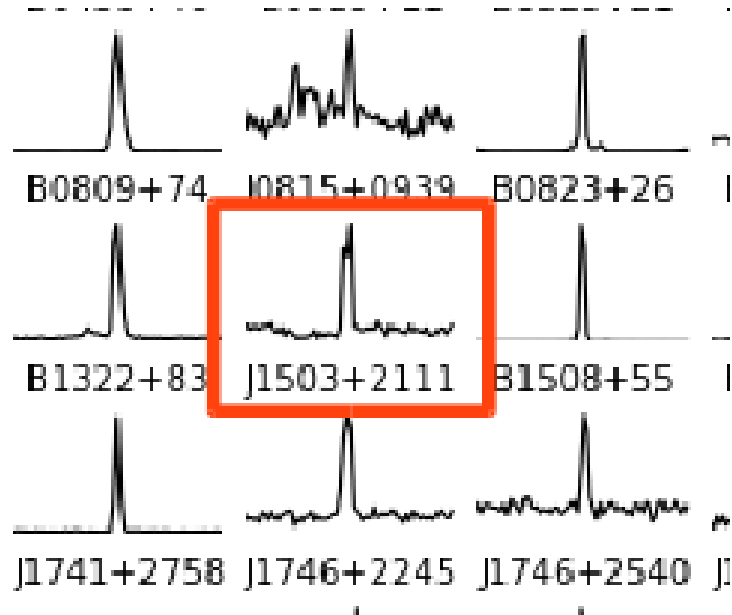


**Mean spectral
index = - 1.4**

Low-freq turnover? (LBA data are coming)



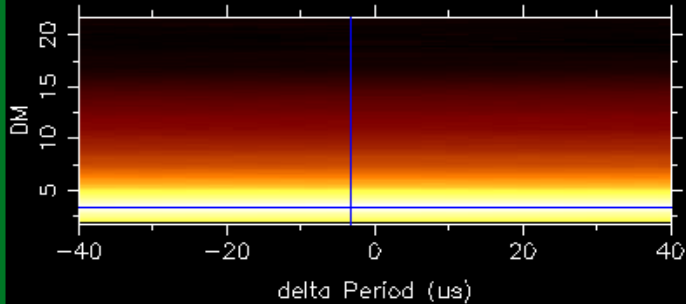
Dispersion measures (J1503+2111)



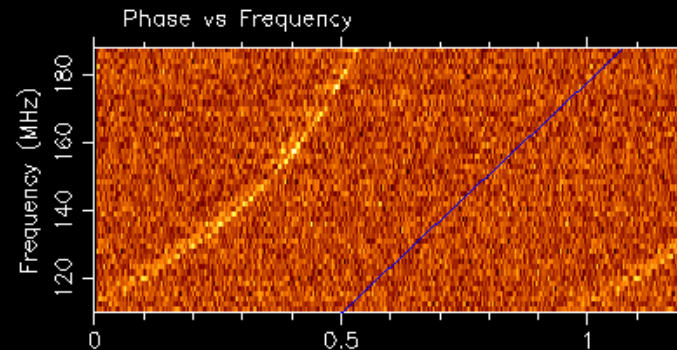
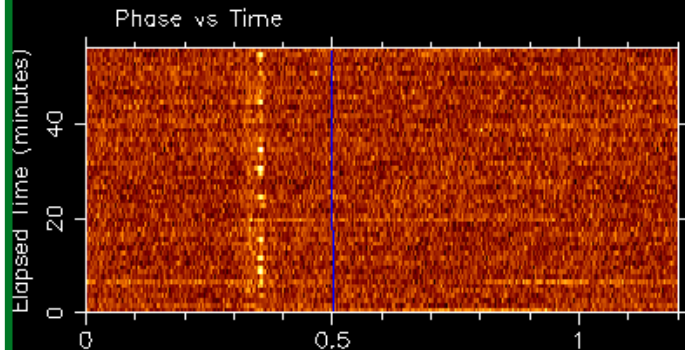
Dispersion measures (J1503+2111)

J1503+2111: J1503+2111_L202465_SAP0_BEAM0_S0.fscr.AR.2_cp400.fscr50

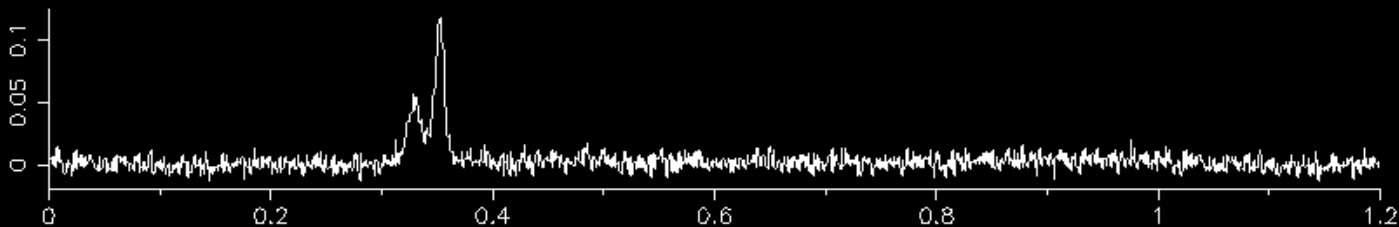
BC P(ms)= 3314.001567552 TC P(ms)= 3313.733741926 DM= 11.750 RAJ= 15:03:54.60 DecJ= 21:11:09.3
BC MJD = 56687.221165 Centre freq(MHz) = 148.923 Bandwidth(MHz) = 78.1250048 l = 29.062 b = 59.296
NBin = 1024 NChan = 50 NSub = 56 TBin(ms) = 3.236 TSub(s) = 60.000 TSpan(s) = 3360.415
P(us): offset = 0.00000, step = 3.19111, range = 40.00000 DM: offset = 0.000, step = 0.099, range = 10.000



$$\begin{aligned} \text{DM}_{\text{ATNF}} &= 11.75 \pm 0.06 \text{ pc/cm}^3 \\ \text{DM}_{\text{census}} &= 3.260 \pm 0.004 \text{ pc/cm}^3 \end{aligned}$$



BC prd (ms):	3313.998376181	TC prd (ms):	3313.730550813	DM:	3.334	BC freq (Hz):	0.301750299
Corrn (ms):	-0.003191371	Corrn (ms):	-0.003191113	Corrn:	-8.416	Freq err. (Hz):	0.000000631
Error (ms):	0.008931790	Error (ms):	0.008931790	Error:	0.038	width (ms):	135.926
						Best S/N:	59.08



First LOFAR Census of normal PSRs

- **Precise DM measurements for 158 detected pulsars**
 - HBA census DMs are typically >10 times more precise than DMs in the ATNF catalogue (0.0015 vs. 0.025 pc/cc)
 - Median DM accuracy – 0.004%
(1 additional electron per every 13 km of interstellar distance)
 - For ~20 pulsars DM accuracy is sufficient to start detecting intrinsic DM variations with sessions ~3 months apart (ongoing timing campaign)
- **Flux densities in 110 – 188 MHz for 158 pulsars, spectral fits for 165 pulsars. New spectral indices for 48 pulsars**